Philadelphia University
Mechatronics Engineering Department
Faculty of Engineering
First Semester 2010/2011

Course Syllabus	
Course Title	**Microcontrollers and Microprocessor Systems**
Course Number	**640474 / 640476**
Course Level	4th year
Class Time	12.10 → 13.00 Sun/Tues/Thurs
Instructor	**Dr. Tarek A. Tutunji**
email	ttutunji@philadelphia.edu.jo
website	www.philadelphia.edu.jo/academics/ttutunji
Prerequisites	Logic Circuits (630261) and Sensors (640364)
Office Hours	Hours: 09.00→10.00 & 11.00→12.00 Sun/Tues/Thurs, Office 700
Text Book	**PIC Microcontrollers: an introduction to microcontrollers** by Martin Bates 2nd edition 2004. Publisher Elsevier / Newnes

Course Description:

This course provides the students with the needed material for understanding, analyzing, and designing microcontroller-based systems. The microcontroller of choice for this class is the PIC 16F84 / 16F877. Examples will focus on mechatronic systems and their applications.

Course Objectives:

- Understand the general architecture for microprocessors and microcontrollers.
- Understand the logical steps in interfacing and programming mechatronic systems.
- Program and download PIC microcontrollers using Assembly and C Languages
- Design mechatronic systems using PIC16F84 and PIC16F877

Course Academic Calendar		
Week	**Subject**	**Notes**
Oct 10	**Introduction to Microprocessors and Microcontrollers**	Class Notes
Oct 17	**Computer Systems** & **Information Coding**	Chapter 1 & 2
Oct 24	**Microelectronics Devices / Digital Systems**	Chapter 3 & 4
Oct 31	**Microprocessors, Microcontrollers, and their Operations**	Chapter 5
Nov 7	**PIC Application**: H/W Design, Assembly Language	Chapter 6
Nov 14	**PIC Program Development**: Program Design, Structure, and Analysis	Chapter 7 *Eid Adha Holiday Nov 16-20*
Nov 21	**PIC 16F84 Architecture** : Block Diagram, Register Sets	Chapter 8 **EXAM I (Nov 22-30)**
Nov 28	**PIC Program**: Compile, Debug, Simulate, and Download *Includes lab work	Class Notes
Dec 5	**Programming Techniques**: Timing and Interrupts	Chapter 9
Dec 12	**DC Motor Applications I**: Open-loop control	Chapter 10 *New Year Dec 12*
Dec 19	**DC Motor Applications II:** Closed loop Control (Position and Speed)	Chapter 13
Dec 26	**PIC Controller Families** **Data Converters**: D/A and A/D	Chapter 14 **EXAM II Dec (22-30)**
Jan 2	**PIC 16F877 Architecture and Applications**	Chapter 15 **Project Due Jan 4th**
Jan 9	**PIC 16F877 Programming** using C Language	Class Notes
Jan 16	**Mechatronics Applications**: Design and Programming	Class Notes
Jan 23	**FINAL EXAMS (Jan 23 – Feb 1)**	

Assessment Instruments

Evaluation of students' performance (final grade) will be based on the following three categories:
- **Exams**. Two in-class exams will be given. Each will cover about 6-weeks of lectures
- **Project**. A project assignment will be handed to the students. The assignment will ask the students to design, program, interface, and build a simple mechatronic system using PIC microcontroller. Students will be evaluated according to their in-lab circuit testing, analytical thinking, and report writing. A group of two students are expected to work on the project.
- **Final Exam**: The final exam will cover all the class material.

Allocation of Marks	
Exam I	15%
Exam II	15%
Project	20%
Final Exam	50%

Other class work will include:
- **Quizzes**. Two 10-minute quizzes will be given to the students throughout the semester. These quizzes will cover material discussed during the previous week of lectures. The quizzes will be used as bonus points (added to the exams' grades) to help the students with their grade.
- **Homework**. Three homework will be assigned to the students (one before each exam). The homework will not be graded nor collected by the instructor. However, students are encouraged to do the homework and discuss their results with the instructor in order to better understand the course and be prepared for the exams.

References:

Books
1. PICmicro MCU microcontroller programming : assembly figures tables examples and projects by A. Salhoot 2006
2. Embedded design with the PIC18F452 Microcontroller by J. Peatman. Prentice Hall 2003
3. Making PIC Microcontroller Instruments and Controllers by H. Sandhu Mcgrew-Hill, 1st edition 2008.
4. Designing Embedded Systems with PIC Microcontrollers, 2nd Edition: Principles and Applications by Tim Wilmshurst. Newnes. 2nd edition 2009.
5. PIC Projects: A Practical Approach by H. Parchizadeh and B. Vuksanovic. Wiley 2009.
6. A Beginner's Guide to Embedded C Programming: Using the PIC Microcontroller and the Hitech Picc-Lite C Compiler by Chuck Hellebuyck. CreateSpace 2008.
7. PIC Microcontroller and Embedded Systems: using assembly and C for PIC18 by Mazidi, Mckinley, and Causy. Prentice Hall 2008
8. Microprocessor Architecture, Programming, and Applications by Gaonker, 5th edition 2002. Prentice-Hall Publishing
9. Microcontroller Based Applied Digital Control by Dogan Ibrahim. Wiley 2006

Websites
- http://www.microchip.com/